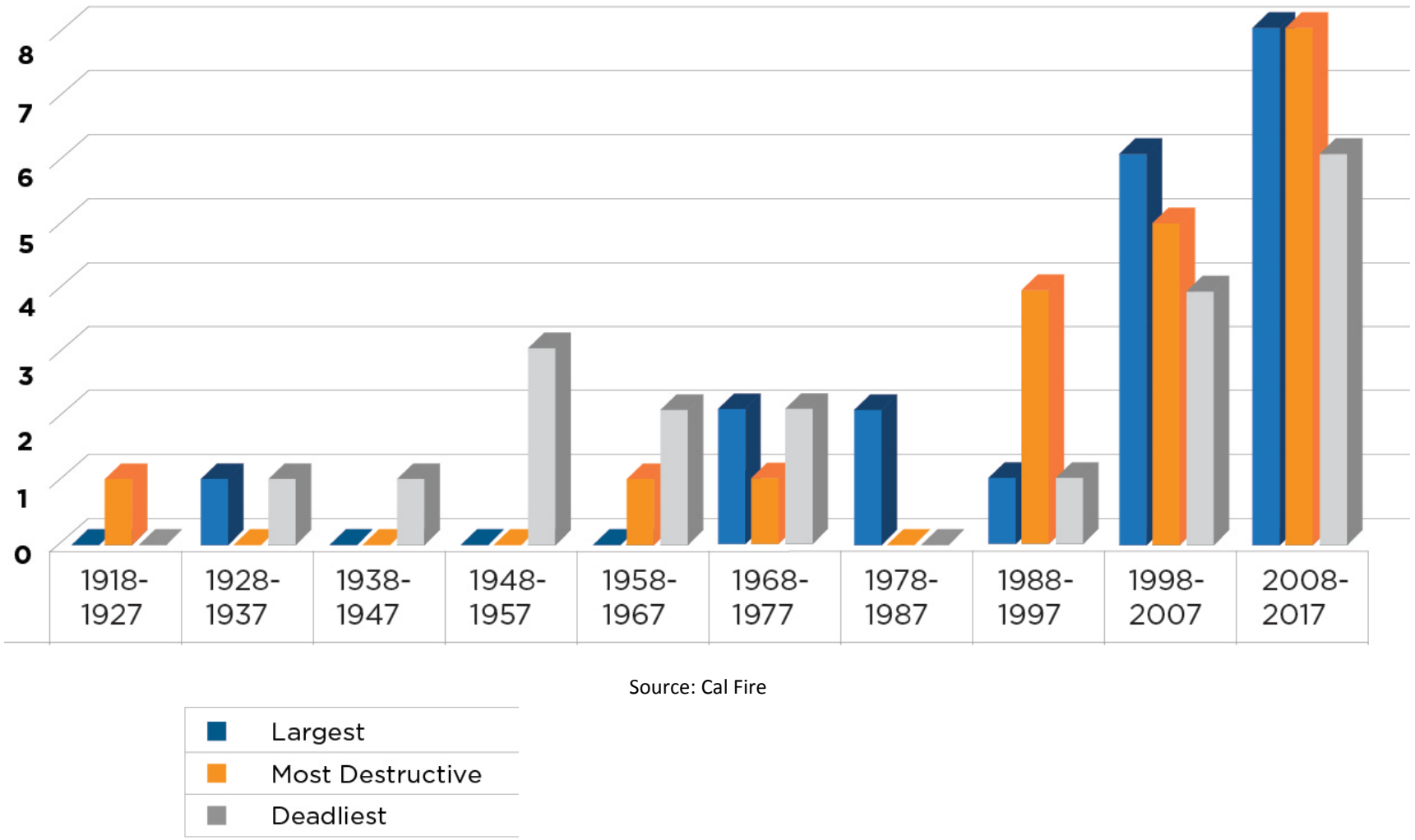
California Collaborative for Climate Change Solutions

Academic-Private-Government Partnerships as Agents of Change: Perspectives from State Agencies

Robert Weisenmiller, Chair, California Energy Commission

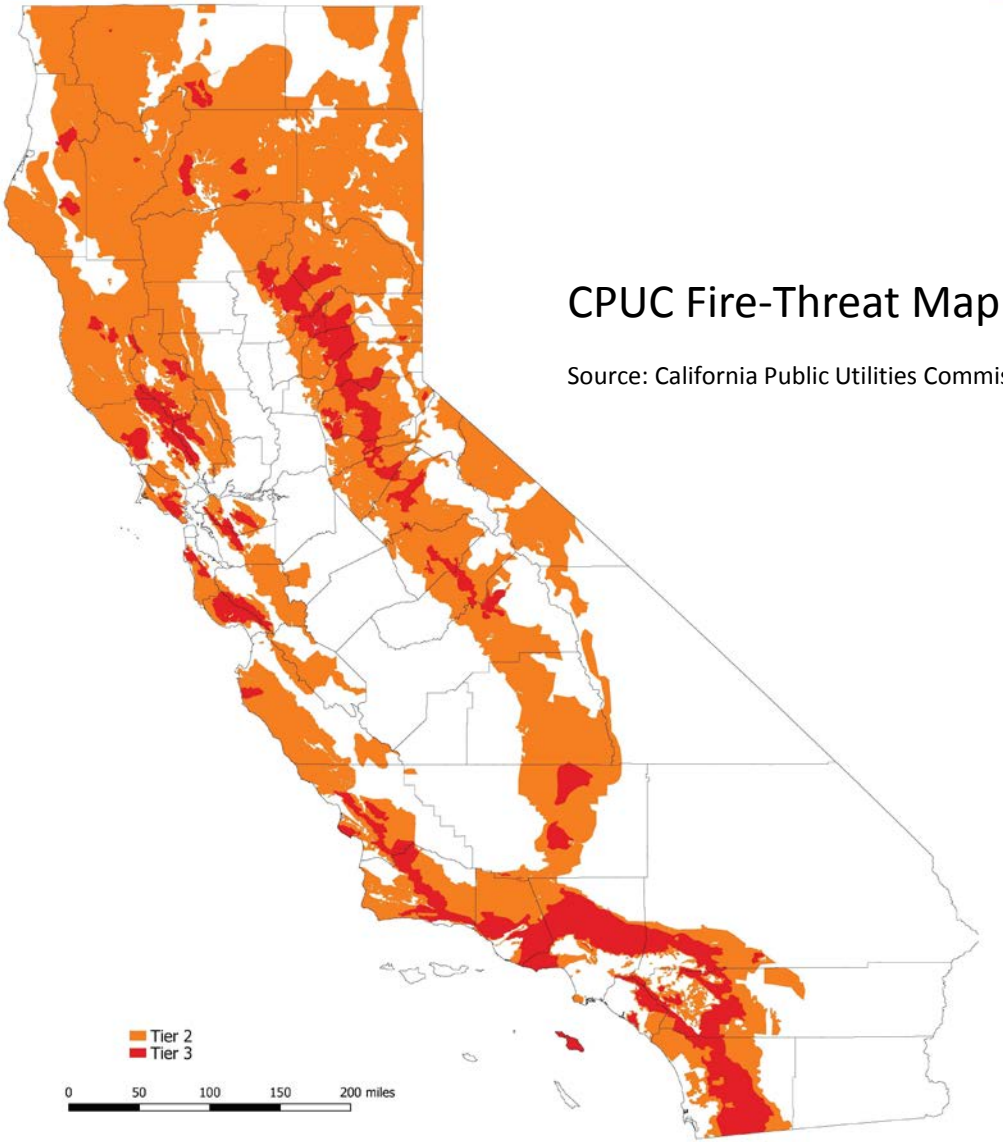
April 4, 2018

Climate Adaptation: Preparing for Future Fires in California



Source: Cal Fire

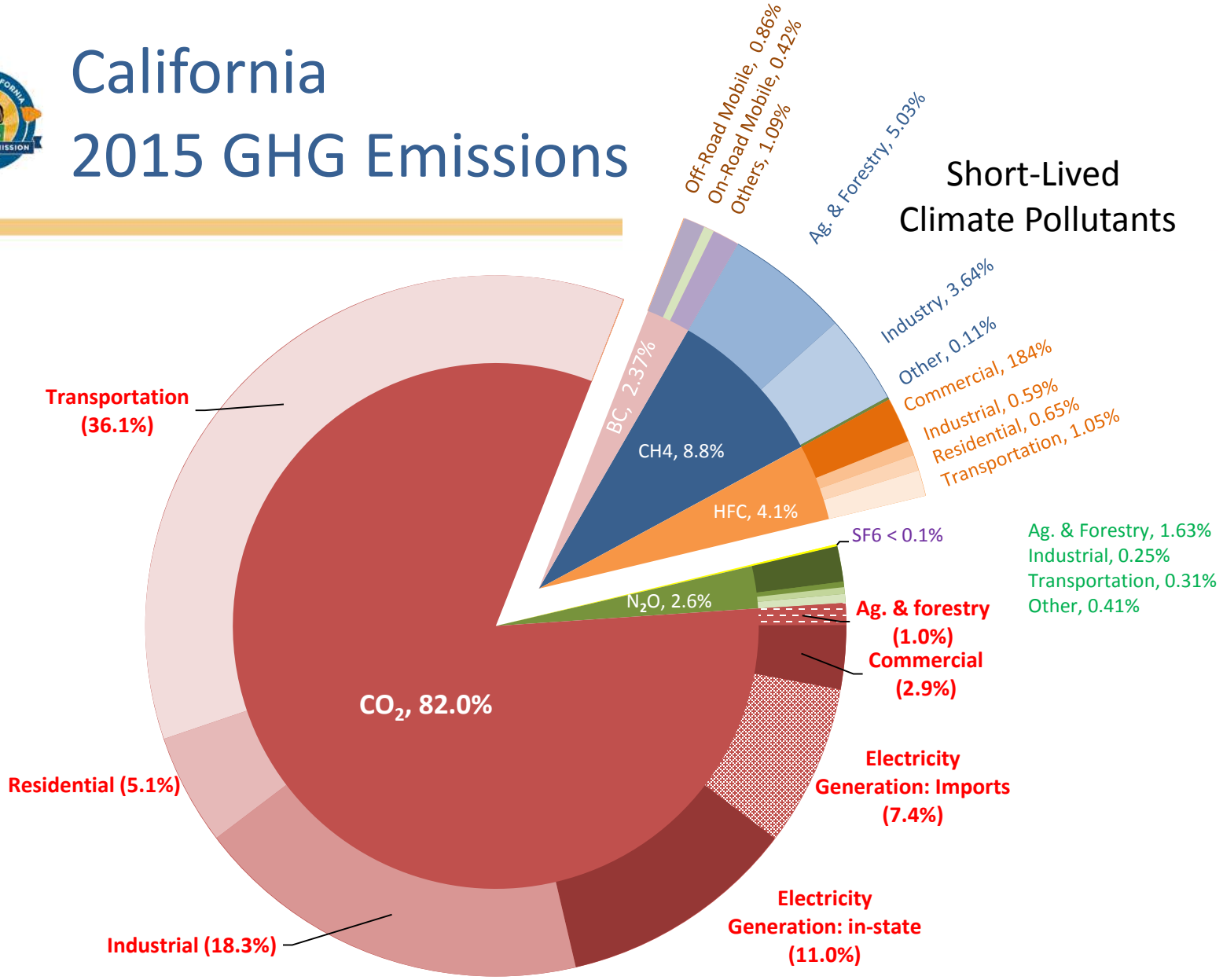
Climate Adaptation: Preparing for Future Fires in California



CPUC Fire-Threat Map

Source: California Public Utilities Commission

California
2015 GHG Emissions



Source: California Energy Commission staff using data from CARB's 2017 Greenhouse Gas Emissions Inventory of 2015 emissions. Black carbon emissions data are from 2013, the most recent data available. The transportation sector is 36.2 percent of total when including black carbon and 38.5 percent when black carbon is not included.

2017 EPIC Program Highlights

- **11** public pre-application workshops
- **5** topical workshops to gather stakeholder input on Distributed Energy Resources, Climate Change and Funding Equity
- **1** public workshop at the onset of investment plan development
- **3** joint public workshops with other EPIC administrators to solicit comments on the proposed investments for *EPIC 2018-2020 Investment Plan*
- Public comment opportunities at **2** CPUC workshops

Backup Slides

PIER Microgrids (Early Demonstrations)

Project Title	Lead	Approach
S **UC San Diego**	UC San Diego	This project focused on microgrid situational awareness. UCSD provided direct access and observational capability of the UCSD microgrid to California Independent System Operator (CAISO). This allowed CAISO to better understand how microgrids operate and how they may interact and participate in CAISO energy markets.
S **Borrego Springs 1.0 EPIC funded 2.0**	SDG&E	This project focused on the design, installation, and operation of a community scale "proof-of-concept" Microgrid. The Microgrid was an existing utility circuit that had a peak load of 4.6 MW serving 615 customers in Borrego Springs, California, a remote area of the San Diego Gas &Electric service territory.
N **Santa Rita Jai**	Chevron Energy Solutions Company	The Santa Rita Jail project successfully demonstrated a microgrid that is able to be independent (island) from the utility, integrate its various energy resources and energy storage system, and resynchronize back to the grid automatically.
S **Camp Pendleton**	Harper Construction	The Camp Pendleton FractalGrid Project is demonstrated an innovative microgrid architecture that integrates multiple intelligent and self aware microgrids. These various microgrids interacted with each other and the utility grid to provide highly secure available power.
N **SMUD**	SMUD	This research demonstrated a microgrid at the Sacramento Municipal Utility District. The project involved the design, construction, and demonstration of a microgrid based on combined heat and power technology. The microgrid was integrated with the Sacramento Municipal Utility District's central heating and cooling equipment, including a chilled-water storage tank.

Existing Microgrids*

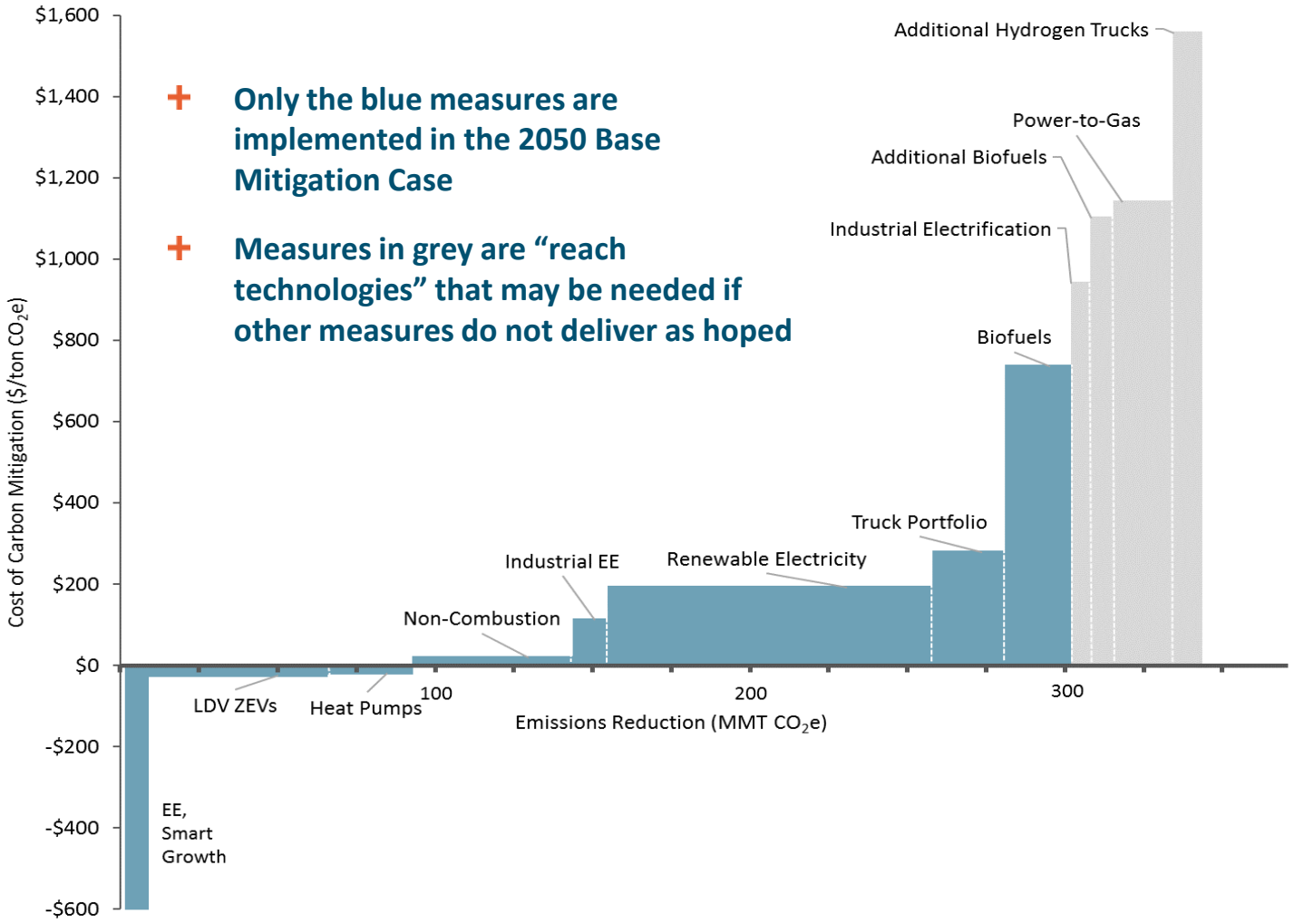
	Project Title	Lead	Approach
N	**Blue Lake Rancheria Microgrid**	Humboldt State	Demonstrate a community-based micorgrid that can operate a Red Cross evacuation shelter in an emergency in islanded mode. The project won Project of the Year at the 2018 Distributech Conference and reduced energy use by $250,000 in the first full year of operation.
S	**Borrego Springs**	SDG&E	The only IOU owned and operated microgrid funded by CEC. This system operates on a section of the grid that has unreliable power at the end of a line. It has successfully islanded as a result of grid outage from a storm. Besides the technologies common to other microgrids in this soliciation, this one also has wind power.
S	**Bosch DC Microgrid**	Bosch	In the final phases of construction, this microgrid will support a Honda parts distribution center in the Inland Empire. Lighting and fork lifts have all been converted to DC and the battery and PV installed. The recipient projects 25% savings on electricity from DC operation. AQMD recently cited microgrids as a useful solution for warehouses in the Inland Empire, making this a stronger candidate for replicability to reduce air quality issues.
N	**City of Fremont Fire Station Microgrids**	Gridscape	Three fire stations in Fremont are being converted to individual microgrids to reduce energy costs for the city and provide islanding funtions for these critical facilities in the event of a grid outage.
N	**Laguna Waste Water Treatment**	Trane	The project will upgrade an existing wastewater treatment plant to create microgrid to provide ancillary services and island in a grid outage.
N	**Las Positas Campus**	Chabot- Las Positas Community College	Developing a community college microgrid which will improve energy reliability on the campu, reduce electrical demand, and participate in anciallary services. It will be able to island from the grid and support critical loads for 10 hours.
N	**Renewable Microgrid for a Medical Center (Kaiser Richmond)**	Charge Bliss	Demonstrating that a renewable-based microgrid with storage can be used to reduce electrical demand in normal operation and island on renewabes and battery in the event of an emergency and provide continuing care from critical facilities in the event of a grid outage.

*all have PV, battery and a controller, at a minimum

New Microgrids

	Project Title	Lead	Approach
S	**Port of Long Beach Microgrid**	Port of Long Beach	Achieve long-term islanding at the Port's critical response facility. Batteries will provide grid services, such as demand response and peak shaving during regular operation of the utility grid. During wide-spread outages or emergencies, a mobile battery can be deployed where needed, such as storm water pump stations and refrigerated container yards..
N	**Camp Parks Microgrid**	LBNL	Create an islandable microgrid meeting critical loads with 100% renewable generation and a modular, nested, replicable architecture that enables conversion of older base electric systems to modern microgrids. The project will develop a business model for a scalable packaged microgrid solution
S	**Miramar Marine Air Station Microgrid**	UCSD	Demonstrates the use of landfill gas power generators and PV in conjunction with a battery energy storage system to create a carbon-neutral grid resource capable of maintaining critical flight line facilities during grid outage.
S	**San Diego Port Microgrid**	San Diego Unified Port District	The proposed microgrid project will incorporate a rooftop solar array, Li-ion battery storage system, energy efficient lighting, and DR (reduce loads in response to SDG&E Critical Peak Price events). A centralized microgrid control system will allow key elements of the terminal to remain operational when islanded from the grid for a minimum of 12 hours to maintains power to DOD strategic port and a jet fuel storage system for the San Diego International Airport.
N S	**Virtual Wide Area Urban Microgrids**	Gridscape	Build on work currently underway at the Fremont Fire Stations to demonstrate a standardized microgrid configuration and package offering with integrated DER that can cover multiple customer segments, multiple meters, different utility territories, and both physical and virtual microgrid integration. Project includes sites in both NoCal and SoCal.
S	**Rialto Microgrid**	Rialto Bioenergy Facility LLC	Demonstrate a microgrid system applicable to wastewater treatment plants and organics management facilities. The microgrid will generate power from food waste and sewage sludge and will support 3 days of islanding with feedstock interruption, or indefinite islanding with continued feedstock supply. The microgrid will be capable of shaving 100% of grid draw during peak power demand in normal operations.
N	**San Jose Community Microgrid**	Willdan Energy Solutions	The microgrid at the San Jose Municipal Stadium and San Jose State University's main campus and sports complex will aggregate 4 DERs comprising solar PV, battery storage, EE measures (indoor lighting, outdoor lighting controls), and DR program. The project will reduce electricity costs for approximately DAC 1,500 residents.
N	**Redwood Coast Airport Microgrid**	Humboldt State University	Demonstrates a microgrid with generation and storage owned by a local CCA, and the microgrid circuit owned by an IOU (PG&E). The microgrid will include PV array direct DC-coupled, a Li-ion battery system, EE for the runway lighting system, and EV chargers that can participate in DR. When islanded during a grid outage, the distributed generation will energize the microgrid with 100% renewable energy. The IOU will own, operate, and maintain the microgrid
N	**Santa Rosa Junior College Microgrid**	Sonoma County Junior College District	Demonstrates a microgrid serving 27 buildings at the Sonoma County Junior College campus in Santa Rosa, CA and integrates three DER elements: PV generation, electrical energy storage, and DR. The goals of the proposed project are to meet 40% of the campus electricity requirement, to reduce the campus' peak load, to provide support services to the surrounding grid, and to create a highly resilient power system benefitting the campus and the community.

E3 2050 $/ton in Base Scenario (2016$)



R&D Funding Recipients

EPIC (2014 - Mar 2018)

Business Entity	Amount	Count	% of Funds
National Lab	$47,687,015	35	8%
Other	$423,723,624	185	74%
UC	$99,424,570	63	17%
Grand Total	**$570,835,209**	**283**	**100%**

PIER ELECTRIC (1998 - Jun 2013)

Business Entity	Amount	Count	% of Funds
National Lab	$101,892,703	67	15%
Other	$371,097,735	323	55%
UC	$197,022,177	102	29%
Grand Total	**$670,012,615**	**492**	**100%**

NATURAL GAS (2005 - Mar 2018)

Business Entity	Amount	Count	% of Funds
National Lab	$27,981,467	27	14%
Other	$140,674,363	148	70%
UC	$31,212,933	44	16%
Grand Total	**$199,868,763**	**219**	**100%**